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Operation Redwing

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Cherokee exploded with an impressive yield of 3.8 megatons but missed its aiming point by six miles. Although regrettable, the miss was not overly significant because the event proved "that the United States owned a real [thermonuclear] weapon."[1] Cherokee was the second of seventeen tests conducted during Operation Redwing, whose primary purpose was to proof test bombs and warheads for an emerging generation of weapon systems. Eleven tests took place at Enewetak Atoll and six at Bikini Atoll. The parsing of tests between the two atolls was based largely on expected yields. Lower yield tests were held at Enewetak with the expectation that they would not impact the permanent tests facilities located on the atoll. Higher yield shots were detonated at Bikini.[2] Although this division worked for the most part, fallout from one Bikini test, Tewa, reached Enewetak, contaminating both personnel and permanent test facilities.[3]

As a test series, Redwing is most notable for the symbiotic relationship between the AEC and the national military establishment. This close relationship, as Norris Bradbury noted in 1951, grew out the military's desire for a weapon for *"practically every type of application conceivable."* One of those applications was a warhead for a torpedo.[4] Other applications included warheads for guided missiles and bombs for smaller and faster jet aircraft.

Redwing is also notable for the emergence of the UCRL as an equal partner to Los Alamos. Following its limited participation in the Castle test series, the UCRL demonstrated significant technical progress during Redwing. On May 27th, for instance, the UCRL successfully conducted two tests, Zuni and Yuma, on the same day. Zuni on Bikini and Yuma on Enewetak. However, when UCRL personnel objected to personnel assignments that seemingly relegated them to inferior roles, they were rebuffed by their Los Alamos commanders.[5] This dust-up exacerbated

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[1] One possible cause for the miss was a nervous air crew. Would they survive the blast? A second possible cause was that the bombardier, misled by competing signal beacons, chose the wrong signal for his bombing vector. A third possible cause was that the crew was hung over. Believing bad weather would cancel their mission, the aircrew spent the night before partying. DOE/NV-209-Rev 16, September 2015; and Rear Admiral B. Hall Hanlon to Alvin Graves, LANL Archives, June 11, 1956. A previous airdrop, Crossroads-Baker, also missed its target.

[2] Hacker, Barton C. *Elements of Controversy: The atomic energy Commission and Radiation Safety in Nuclear Weapons Testing, 1947-1974*. 178.

[3] *Defense nuclear Agency: Operation Redwing, 1956. DNA-6037F*, 2

[4] Bradbury to Fields, LANL Archives, October 9, 1951. Fortunately, the torpedo was never used since it had a kill ratio of two – both the target and the boat that fired the torpedo.

[5] All scientific personnel were co-located in the same Task Group under Los Alamos physicist Galen Felt. William Ogle, another Los Alamos physicist, was the Deputy Scientific Commander for the entire JTF. Tension already existed between the two Labs prior to Redwing as a result of comments and actions by Edward Teller that Bradbury took exception with. After reading a **Life** magazine article highly laudatory of Teller, Bradbury sent a scathing, point-by-point rebuttal to United States Senator Clinton Anderson saying, in part, *"Much of the presently-appearing distortions of the technical history of the development of the thermonuclear weapon … appear to center around the personality of Edward Teller."*

the already strained relations between the two laboratories and led the UCRL to search for its own test site for future operations.

Finally, Redwing is notable for the attempt by Los Alamos to reduce radioactive fallout. Castle-Bravo, of course, called into question the environmental and public health consequences of testing. Reacting to these concerns, Los Alamos testing "clean" versions of some of its Redwing devices, seeking to reduce the amounts of ^{90}Sr and ^{137}Cs, the two isotopes of most concern in worldwide radioactive fallout.[6] Public opinion was unaffected and weaponeers decried the very cumbersome clean designs.

Redwing met its primary goal of answering the military's call for designs that could be weaponized. In this sense, Redwing served notice of a new era in weapon design – one marked by design improvement rather than revolutionary new designs. As Los Alamos mathematician Stan Ulam, the co-inventor of the hydrogen bomb, commented "One cannot help feeling that the field of weapon design is being exhausted and at least without a relatively new idea, there will be no big surprises."[7]

[6] The use of the term "clean" was a misnomer. Clean devices only produced marginally less radioactivity. Los Alamos Theoretical Division, *T-1038: Long Range Fallout and Clean Weapons*, LANL Archives, July 8, 1950. The desire to convince the public that clean bombs worked as advertised also led the AEC to an aborted invite for a delegation from the United Nations to observe and analyze the detonation of a clean device during the 1958 Hardtack I test series.

[7] Ulam to von Neumann, Los Alamos Theoretical Division Memo, T-841, LANL Archives, June 20, 1956.

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Test	**Date**	**Sponsor**	**Location (Atoll)**	**Type**	**Yield Range**
Lacrosse	05/04/1956	LANL	Enewetak	Surface	40 kt
Cherokee	05/20/1956	LANL/DoD	Bikini	Airdrop	3.8 Mt
Zuni	05/27/1956	LLNL	Bikini	Surface	3.5 Mt
Yuma	05/27/1956	LLNL	Enewetak	Tower	190 tons
Erie	05/30/1956	LANL	Enewetak	Tower	14.9 kt
Seminole	06/06/1956	LANL	Enewetak	Surface	13.7 kt
Flathead	06/12/1956	LANL	Bikini	Barge	365 kt
Blackfoot	06/12/1956	LANL	Enewetak	Tower	8 kt
Kickapoo	06/13/1956	LLNL	Enewetak	Tower	1.49 kt
Osage	06/16/1956	LANL	Enewetak	Airdrop	1.7 kt
Inca	06/21/1956	LLNL	Enewetak	Tower	15.2 kt
Dakota	06/25/1956	LANL	Bikini	Barge	1.1 Mt
Mohawk	07/02/1956	LLNL	Enewetak	Tower	360 kt
Apache	07/08/1956	LLNL	Enewetak	Barge	1.85 Mt
Navajo	07/10/1956	LANL	Bikini	Barge	4.5 Mt
Tewa	07/20/1956	LLNL	Bikini	Barge	5 Mt
Huron	07/21/1956	LANL	Enewetak	Barge	250 kt